



INSTRUCTIONS

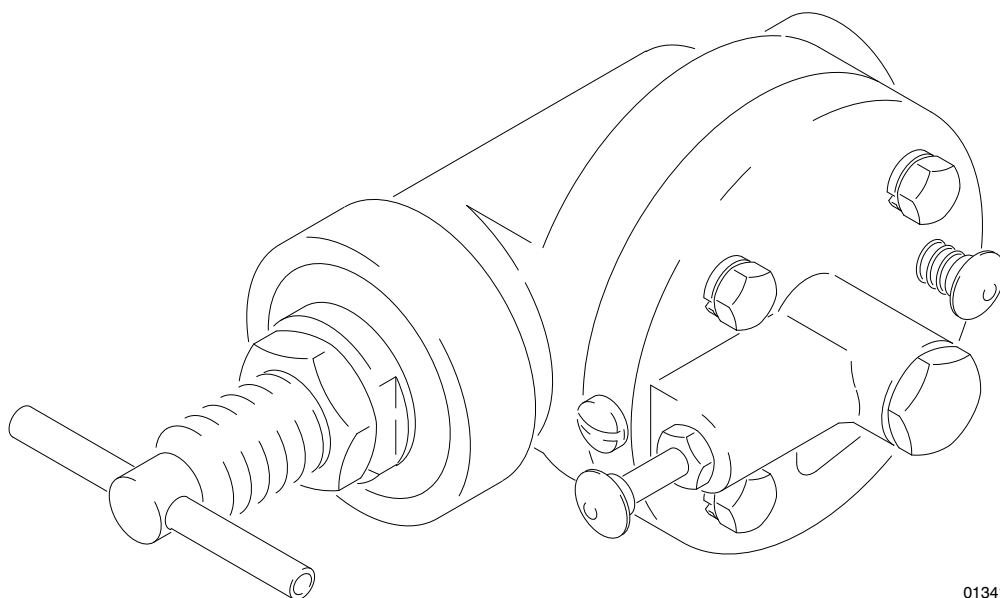
This manual contains important
warnings and information.
READ AND KEEP FOR REFERENCE.

AIRGARD™

Pump Runaway Valve

120 psi (8.4 bar) Maximum Working Pressure

Part No. 224-040, Series B



01341

Table of Contents

Warnings	2
Installation	3
Operation	5
Troubleshooting	7
Service	8
Parts	10
Dimensions	11
Technical Data	11
Warranty	12
Graco Phone Numbers	12

WARNING



INSTRUCTIONS

EQUIPMENT MISUSE HAZARD

Equipment misuse can cause the equipment to rupture or malfunction and result in serious injury.

- This equipment is for professional use only.
- Read all instruction manuals, tags, and labels before operating the equipment.
- This valve is for use only with compressed air. It is not designed for use with any other power source. Do not use any other gas or fluid in the runaway valve.
- Use the equipment only for its intended purpose. If you are not sure, call Graco Technical Assistance at 1-800-543-0339.
- Do not alter or modify this equipment.
- Check equipment daily. Repair or replace worn or damaged parts immediately.
- Test the runaway valve periodically and perform routine maintenance and cleaning. See page 6.
- Do not exceed the maximum working pressure of the lowest rated system component. The maximum working pressure of this equipment is 120 psi (8.4 bar).
- Wear hearing protection when operating this equipment.
- Comply with all applicable local, state, and national fire, electrical, and safety regulations.



MOVING PARTS HAZARD

Moving parts, such as the air motor piston, can pinch or amputate your fingers.

- Do not use the runaway valve as a pump shutoff valve. Under normal operation, when the valve trips the pump will stop, although a small amount of air will still flow. However, if there is a leak in the valve, the pump may continue to operate slowly after the valve trips.
- Keep clear of all moving parts when starting or operating the pump.
- Before servicing the equipment, follow the **Pressure Relief Procedure** on page 5 to prevent the equipment from starting unexpectedly.

Installation

Reference letters and numbers in the text refer to Figs. 1 and 2 and the Parts Drawing on page 10.

Install an air filter (A) to remove harmful dirt and moisture from the compressed air supply. Install a main air shutoff valve (B) to isolate the runaway valve for servicing. If you supply your own accessories, be sure they are adequately sized and pressure-rated to meet the system's requirements.

The Typical Installations shown on page 4 are only examples. Contact your Graco representative or Graco Technical Assistance (see back page) for assistance in designing a system to meet your particular needs.

Install one runaway valve for each pump; the valve will control only one pump.

WARNING

A bleed-type master air valve (C) is required in your system. The bleed-type master air valve relieves air trapped between this valve and the pump after the air is shut off. Trapped air can cause the pump to cycle unexpectedly. Locate the valve close to the pump.

Installing the Runaway Valve on King™, Bulldog®, and Senator® Motors

Detail A of Fig. 1 shows the runaway valve (D) used with a Bulldog® air motor, mounted on a cart. Mounting on a wall bracket is done the same way. To eliminate nuisance tripping of the runaway valve caused by air motor changeover, mount the air regulator (F) between the air motor and the runaway valve. Use the 90° swivel adapter (G, supplied) to connect the runaway valve outlet to the air regulator inlet.

Installing the Runaway Valve on President® Motors

Details B and C of Fig. 1 show the runaway valve (D) used with a President® air motor, mounted on a wall and on a cart. When used with low air flows such as with a President air motor, the runaway valve operates more reliably installed between the air regulator (F) and the air motor. Use the 90° swivel adapter (G, supplied) to connect the runaway valve outlet to the air line.

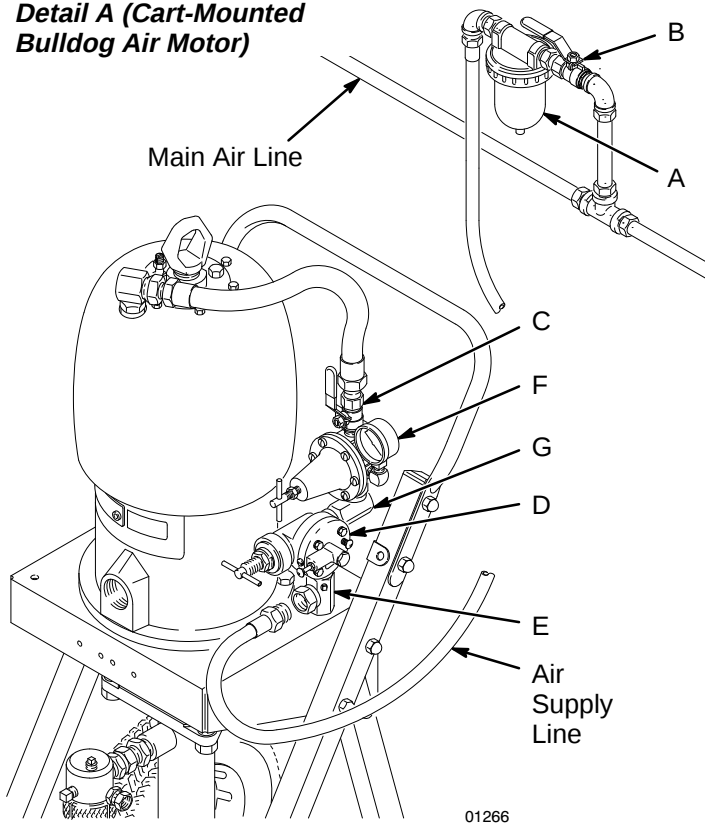
Signal Port (See Fig. 2)

When the runaway valve trips, the signal port (S) is pressurized. This air pressure will operate a pilot-operated valve to turn on a remote device such as a signal lamp or alarm. The pressure at this port will be 15% less than the inbound air pressure. *The volume of air passing through the port will be low.*

When no remote sensor is being used, this port is plugged with a screw (3).

Installation

Detail A (Cart-Mounted Bulldog Air Motor)



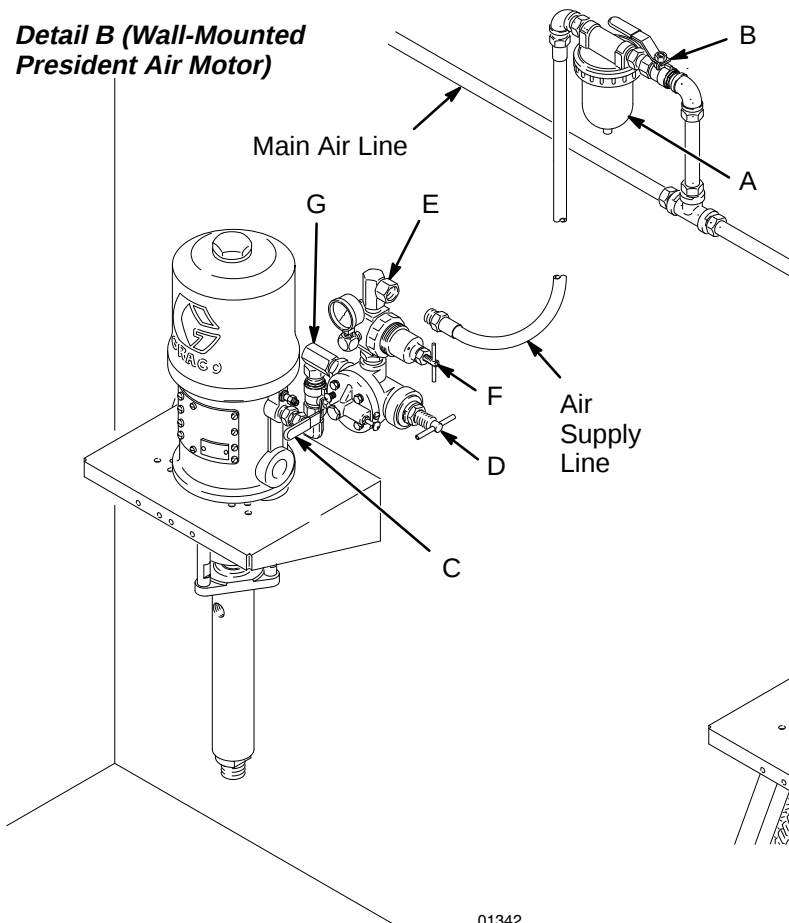
KEY

- A** Air Line Filter
- B** Main Air Shutoff Valve
- C** Bleed-Type Master Air Valve (required, for pump)
- D** Pump Runaway Valve
- E** Air Manifold
- F** Air Regulator
- G** Runaway Valve Swivel (supplied)

Recommended Adapters

- 175-013** Nipple: 3/4 npt
- 157-191** Reducer; 3/4 npt x 1/2 npt
- 160-327** Swivel Adapter; 3/4 npt(m) x 3/4 npsm(f)

Detail B (Wall-Mounted President Air Motor)



Detail C (Cart-Mounted President Air Motor)

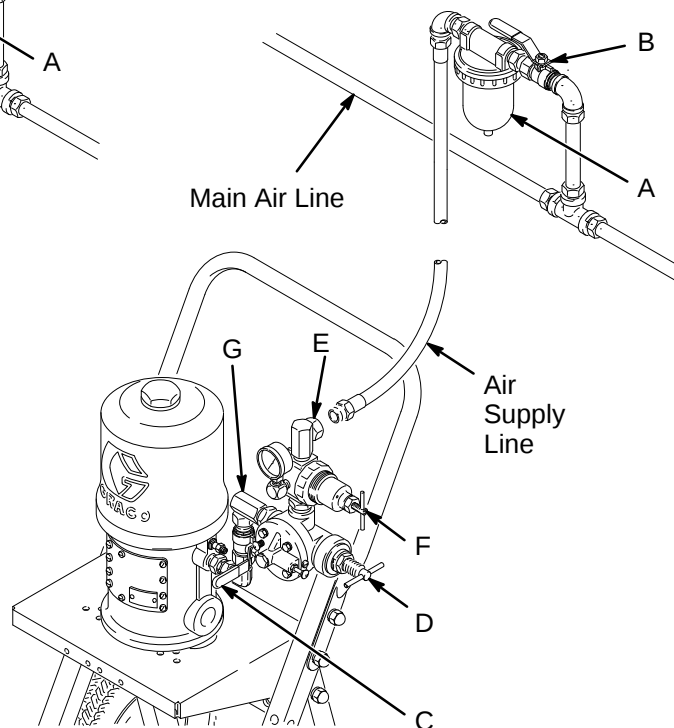


Fig. 1

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Operation

Pressure Relief Procedure

WARNING

PRESSURIZED EQUIPMENT HAZARD

The system pressure must be manually relieved to prevent the system from starting or spraying accidentally. To reduce the risk of an injury from accidental spray from the gun, splashing fluid, or moving parts, follow the **Pressure Relief Procedure** whenever you:

- are instructed to relieve the pressure,
- stop spraying,
- check or service any of the system equipment,
- or install or clean the spray nozzle.

1. Follow the **Pressure Relief Procedure** in your separate pump manual.
2. Shut off the main air valve.

Causes of a Runaway Pump

Pump runaway refers to a rapid acceleration in pump speed, which can result in serious damage to the pump parts caused by overheating and scoring. Conditions which can cause pump runaway are:

- The fluid supply container is empty, or the fluid supply has been interrupted.
- The pump is cavitating, which means that it has lost its prime because an air pocket has formed around the pump intake. This happens most frequently with highly viscous fluids.

- A fluid hose downstream from the pump has ruptured, resulting in an increased pump cycle rate.

NOTE: The runaway valve may also trip if changes to the system result in an increased cycle rate. For example, if you increase the number of gun drops, you should readjust the valve to account for the increased cycle rate.

When in a runaway condition, the pump requires much more air than during normal operation. The runaway valve senses this rapid increase in the volume of air being used and greatly reduces the air flow, stopping pump operation.

WARNING



MOVING PARTS HAZARD

To reduce the risk of serious injury including pinching or amputation of fingers or hands, do not use the runaway valve as a pump shutoff valve. Under normal operation, when the valve trips the pump will stop, although a small amount of air will still flow. However, if there is a leak in the valve, the pump may continue to operate slowly after the valve trips. The air motor piston (located behind the air motor plates or shield) moves when air is supplied to the motor. Do not operate the pump with the air motor plates or shield removed.

NOTE: The sudden surge of air when starting the pump may cause the valve to trip. Turn on the air slowly, or readjust the valve.

Operation

Adjusting the Valve

1. Loosen the adjustment locknut (24). See Fig. 2.
2. Check that the T-handle (2) is turned all the way **counterclockwise**.
3. Open the dispensing valve or trigger the spray gun.
4. **Slowly** open the main air shutoff valve (B), the air regulator (F), and the bleed-type master air valve (C). See Fig. 1.

NOTE: A faint hissing sound from the runaway valve is normal. The valve vents a small amount of air from the poppet vent (H) during operation.

5. Adjust the pump to the desired regulated air pressure and cycle rate.
6. Turn the T-handle (2) **clockwise** until the runaway valve trips. Press and hold the RESET valve (R); you will feel pressure on the RESET valve. Turn the handle (2) **counterclockwise** (approximately 1 to 5 turns) until pressure on the RESET valve decreases. Release the RESET valve.

NOTE: At low pressure or a slow cycle rate, perform step 6, then turn the T-handle (2) **clockwise** until you feel a slight pressure pushing on the RESET valve (R). (Turn it approximately half the counterclockwise distance in step 6.) This may take several tries to achieve the proper setting.

7. Tighten the locknut (24).
8. Test the runaway valve as described in the following paragraph.

Testing the Valve

Test the runaway valve periodically, to ensure proper operation. To test, press the TEST valve (T). The runaway valve should trip. Start the pump by pressing the RESET valve (R) and holding it in for 5 seconds.

Dirt and debris in the compressed air supply may collect in the runaway valve and affect operation. If the runaway valve does not operate properly when tested, disassemble and clean the valve as explained on page 8.

Resetting the Valve

1. Determine the condition that caused the runaway valve to trip. Correct the condition.
2. If the air was shut off, turn it back on slowly. A sudden surge of air will cause the runaway valve to trip.
3. Press the RESET valve (R) and hold it in for 5 seconds. The pump should restart.

NOTE: In some installations, particularly where there is low air volume, it may be necessary to turn off the air supply to reset the valve.

-  Shown plugged with screw.
-  Not in view.

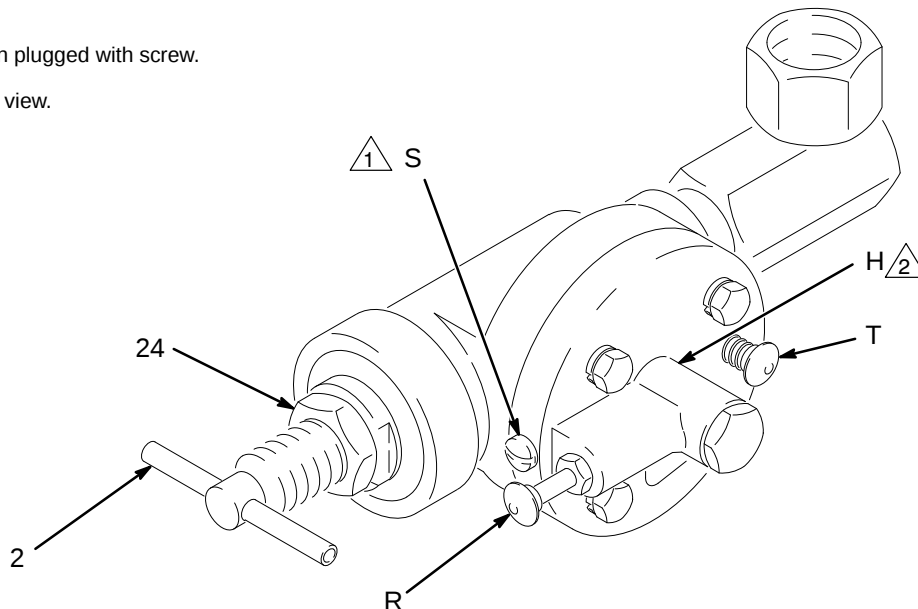


Fig. 2

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Troubleshooting

PROBLEM	CAUSE	SOLUTION
Valve does not slow down pump when it should; pump runs away	Valve is not adjusted properly.	Readjust valve and test. See page 6.
	Ruptured diaphragm. (If diaphragm is ruptured, the TEST button will have no effect.)	Replace the diaphragm. See page 8.
	Decreased air pressure has caused pump speed to decrease.	Readjust valve and test. See page 6.
	Piston is stuck.	Disassemble and clean valve. Replace o-rings. See page 8.
	Poppet valve (11, 14, 15) is stuck closed.	Disassemble and clean poppet valve. See page 8.
Constant blast of air from vent when air supply is turned on.	Poppet valve (11, 14, 15) is stuck open.	Disassemble and clean poppet valve. See page 8.
Valve shuts down for no apparent reason	Increased air pressure has caused pump speed to increase.	Readjust valve and test. See page 6.
	Interrupted or exhausted fluid supply.	Check fluid supply and ensure that it remains constant.
	Valve is not adjusted properly.	Readjust valve and test. See page 6.
	Decreased pump outlet pressure.	Check for properly adjusted fluid outlet pressure.
	Defective poppet valve.	Check and repair. See page 8.
	Air supply was turned on too quickly.	Press RESET valve.
	Air leaking around TEST valve.	Replace TEST valve.
Valve does not reset when RESET valve is pressed	Piston is stuck; no air is escaping from vent.	Disassemble and clean runaway valve. See page 8.
	Air blowing from poppet vent.	Remove RESET valve. Clean needle and seat area. See page 8.
	Valve is not adjusted properly.	Readjust valve and test. See page 6.
	Poppet vent hole plugged.	Disassemble and clean poppet valve. See page 8.

Service

Tools Required

- 10 mm socket wrench
- 11/16" socket wrench
- Adjustable wrench
- Torque wrench
- 1" crow's-foot
- 1/2" (13 mm) brass rod, or a press
- Mallet
- Small needle-nose pliers
- O-ring pick
- Thread lubricant
- Lithium-base grease

Disassembly (See the Parts Drawing on page 10)

NOTE: Repair Kit 224–937 is available to service the diaphragm and o-rings. For best results, use all parts in the kit. Parts included in the kit are marked with an asterisk (for example, 4*).

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 5.

1. **Relieve the pressure.** Tighten the locknut (24) to lock the valve at its current adjustment. Remove the runaway valve from the air line.
2. Place the valve in a vise with the T-handle (2) facing left and the poppet valve cap (25) facing upward. Unscrew the adapter (34) from the valve outlet.
3. Using an adjustable wrench on the flats, unscrew the stem guide (17) from the lower housing (22). The adjustment screw (21) will come free with the stem guide and connecting parts.
4. Reach into the valve outlet and push out the piston (18). Remove the o-rings (6, 36) from the piston.
5. Insert a brass rod into the valve outlet so it contacts the valve body (16). Tap the rod with a mallet to unseat the valve body. (This can also be done with a press.) Push the valve body out of the housing (22).
6. Remove the o-rings (5, 7) from the valve body (16). Remove the gasket (13) from the housing (22).
7. Using an 11/16" socket wrench, loosen but do not remove the cap (25) from the upper housing (23).
8. Unscrew the valve housing (19) and pull the RESET valve assembly out of the upper housing (23).

NOTE: The RESET valve assembly is press-fit together. Do not disassemble it unless the needle (20) or valve housing (19) require replacement.

NOTE: The TEST valve assembly (items 11, 12, 32 and 33) is also press-fit together. Do not disassemble it unless it is leaking and the parts require replacement.

9. Using a 10 mm socket wrench, remove the four screws (9) and lockwashers (1). Pull the upper housing (23) away from the lower housing (22). Remove the diaphragm (27).
10. Unscrew the cap (25) from the upper housing (23). Remove the gasket (10) from the cap. Remove the poppet valve spring (11). Push down on the poppet so the dowel pin (8) protrudes from the hole on the inside of the housing (23). Grasp the dowel pin (8) with a needle-nose pliers and pull it out of the housing.
11. Remove the poppet (14), push pin (15), and o-ring (4) from the upper housing (23).
12. Clean all parts and inspect for damage. Be sure to clean all air passages, cavities, and surfaces.

Service

Reassembly (See the Parts Drawing on page 10)

1. Place the lower housing (22) in a vise. Install the diaphragm (27*) in the lower housing so the larger center plate of the diaphragm is facing outward. Align the four large holes in the diaphragm with the four threaded holes in the housing.
2. Lubricate the dowel pin (8). Working from the inside of the upper housing (23), insert the pin (8) into the small center hole. Push the pin all the way in, so it is flush with the surface of the housing.
3. Install the upper housing (23) so the boss (marked RESET) is oriented as shown, and the four holes are aligned with the holes in the diaphragm (27) and lower housing (22). Assemble the two housings using the four screws (9) and lockwashers (1). Using a 10 mm socket wrench, torque to 50–70 in-lb (5.6–7.9 N.m).
4. Grease the o-ring (4*) and install it on the push pin (15). Install the valve poppet (14*) on the barbed end of the push pin. Insert these parts into the center hole of the upper housing (23), with the poppet (14) facing outward.
5. Install the spring (11*) in the upper housing (23) and seat it on the poppet (14). Install the gasket (10*) on the spring retainer cap (25). Apply lithium-base grease to the threads of the retainer cap. Screw the cap into the housing using an 11/16" socket wrench, and torque to 50–70 in-lb (5.6–7.9 N.m).
6. Install the RESET valve in the upper housing. Tighten the valve housing (19) to secure.
7. Install the gasket (13*) into the lower housing (22), making sure it seats on the inside shoulder.
8. Grease the two o-rings (5*, 7*). Install the larger o-ring (5*) in the outside groove of the valve body (16), and the smaller o-ring (7*) in the inside groove. Slide the valve body into the lower housing (22), with the end holding the o-rings facing into the housing. Use a brass rod and mallet (or a press) to seat the valve body securely in the housing.
9. Grease the large piston o-ring (6*), but not the other (36*). Install the two o-rings in the grooves of the piston (18). Slide the piston into the valve body (16), with the narrow end facing inward. Push the piston into the valve body as far as it will go.
10. Apply thread lubricant and turn the adjustment screw (21) all the way **counterclockwise**, then install it and the stem guide (17) in the lower housing (22). Use a 1" crow's-foot to torque the guide to 10–15 ft-lb (14–20 N.m), so its shoulder is flush with the surface of the housing.
11. Screw the adapter (34) into the valve outlet. Reinstall the runaway valve in the air line. Adjust and test the valve as described on page 6.

Parts

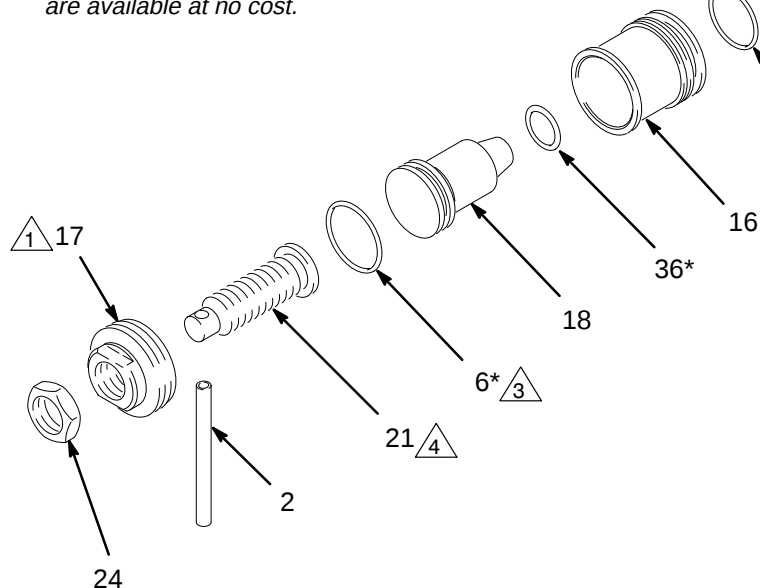
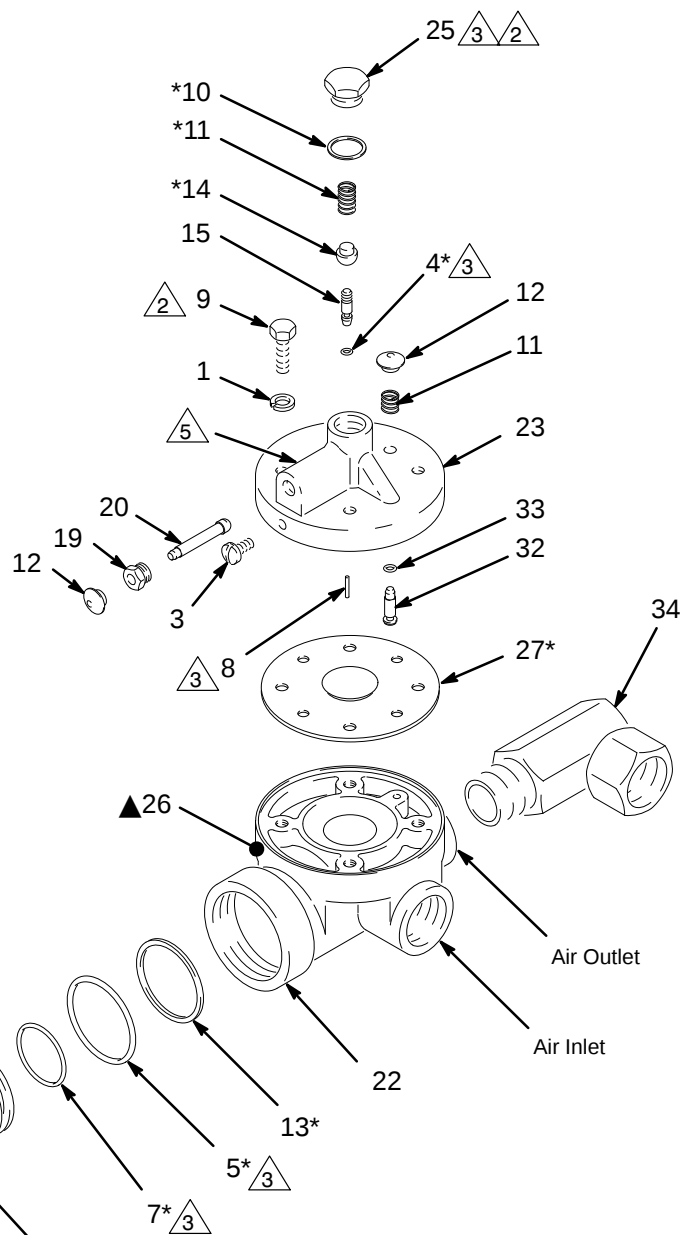
Model 224-040, Series B

Includes items 1-36

Ref. No.	Part No.	Description	Qty.
1	100-016	LOCKWASHER, spring; 1/4"	4
2	102-073	PIN, spring, straight	1
3	103-833	SCREW, machine; 10-32 unf-2a; 0.375" (9.5 mm) long	1
4*	104-007	O-RING; buna-N	1
5*	104-010	O-RING; buna-N	1
6*	105-399	O-RING; nitrile	1
7*	110-782	O-RING; buna-N	1
8	105-402	PIN, dowel	1
9	111-687	SCREW, cap, hex hd; M6 x 1; 20 mm long	4
10*	150-451	GASKET; copper	1
11*	158-918	SPRING, compression	2
12	158-920	PUSHBUTTON	2
13*	166-601	GASKET; Teflon®	1
14*	169-218	POPPET, valve	1
15	176-671	PIN, push	1
16	186-706	BODY, valve	1
17	186-707	GUIDE, stem	1
18	186-708	PISTON	1
19	186-709	HOUSING, valve	1
20	186-710	NEEDLE, valve	1
21	186-711	SCREW, adjustment	1
22	186-713	HOUSING, valve, lower	1
23	186-714	HOUSING, valve, upper	1
24	187-545	NUT, jam, hex; 3/4-32 un-2b	1
25	187-549	CAP, spring retainer	1
26▲	187-854	LABEL, warning	1
27*	224-945	DIAPHRAGM	1
32	188-102	NEEDLE, valve	1
33	157-628	O-RING	1
34	160-327	ADAPTER, swivel; 3/4 npt(m) x 3/4 npsm(f)	1
36*	111-027	O-RING; buna-N	1

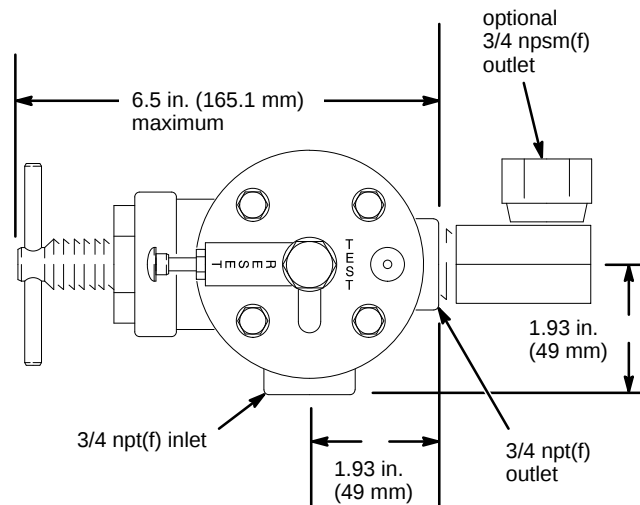
* These parts are included in Repair Kit 224-937, which may be purchased separately.

▲ Replacement Danger and Warning labels, tags and cards are available at no cost.



- 1 Torque to 10-15 ft-lb (14-20 N.m).
- 2 Torque to 50-70 in-lb (5.6-7.9 N.m).
- 3 Apply lithium base grease.
- 4 Apply thread lubricant.
- 5 Boss (marked "RESET").

Dimensions



01307

Technical Data

Maximum air input pressure	120 psi (8.4 bar)
Air pressure range	20–120 psi (1.4–8.4 bar)
Air volume range	5–250 cfm (0.14–7.0 m ³ /min)
Maximum operating temperature	150°F (65.5°C)
* Sound power	Less than 70 dBA
Air inlet	3/4 npt(f)
Air outlet	Without swivel attached: 3/4 npt(f); With swivel attached: 3/4 npsm(f)
Weight	Without swivel attached: 2 lb 5 oz (1.05 kg); With swivel attached: 3 lb (1.36 kg)

* Tested in accordance with ISO 3744.

Manual Change Summary

Assembly Changed	Part Status	Ref. No.	Part No.	Name
224-040 Runaway Valve, to Series B	Old	7	105-400	O-ring
	New	7	110-782	O-ring
	Added	26	187-854	Warning Label

The Graco Warranty and Disclaimers

WARRANTY

Graco warrants all equipment manufactured by it and bearing its name to be free from defects in material and workmanship on the date of sale by an authorized Graco distributor to the original purchaser for use. As purchaser's sole remedy for breach of this warranty, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment proven defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

This warranty does not cover, and Graco shall not be liable for, any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non-Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility with Graco equipment of structures, accessories, equipment or materials not supplied by Graco, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claim. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor and transportation.

DISCLAIMERS AND LIMITATIONS

The terms of this warranty constitute purchaser's sole and exclusive remedy and are in lieu of any other warranties (express or implied), **including warranty of merchantability or warranty of fitness for a particular purpose**, and of any non-contractual liabilities, including product liabilities, based on negligence or strict liability. Every form of liability for direct, special or consequential damages or loss is expressly excluded and denied. In no case shall Graco's liability exceed the amount of the purchase price. Any action for breach of warranty must be brought within two (2) years of the date of sale.

EQUIPMENT NOT COVERED BY GRACO WARRANTY

Graco makes no warranty, and disclaims all implied **warranties of merchantability and fitness for a particular purpose**, with respect to accessories, equipment, materials, or components sold but not manufactured by Graco. These items sold, but not manufactured by Graco (such as electric motor, switches, hose, etc.) are subject to the warranty, if any, of their manufacturer. Graco will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

Graco Phone Numbers

TO PLACE AN ORDER, contact your Graco distributor, or call this number to identify the distributor closest to you: **1-800-367-4023 Toll Free**

FOR TECHNICAL ASSISTANCE, service repair information or assistance regarding the application of Graco equipment: **1-800-543-0339 Toll Free**

Sales Offices: Atlanta, Chicago, Detroit, Los Angeles
Foreign Offices: Belgium, Canada, England, Korea, Switzerland, France, Germany, Hong Kong, Japan

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